STATISTICAL MODELING FOR ROAD CROSSING BEHAVIOR OF PEDESTRIANS ON URBAN ROADS

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by

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Dedicated to my family

Certificate

It is hereby certified that the thesis entitled **"Statistical modeling of pedestrian behavior on urban roads"** submitted by **Ms. Mariya Khatoon** to the Indian Institute of Technology Delhi, for the award of the degree of **Doctor of Philosophy**, is a record of the original bonafide research work carried out by her under our supervision and guidance. The thesis work, in our opinion, has reached the requisite standard fulfilling the requirements for the degree of Doctor of Philosophy. The results contained in this thesis have not been submitted in part or in full, to any other university or institute for the award of any degree or diploma.

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Abstract

This thesis explored the utility of binary probabilistic modeling and its performance measures to analyze the pedestrians' unsafe road crossing behavior exhibited by different types of pedestrians and their associated risk at different traffic and road environments.

For the analysis we have collected the data at six different types of pedestrian crosswalks in Delhi. The selected locations are signalized crosswalks and non- signalized crosswalks such as near bus stops, foot of flyovers/grade separators, and free left turn.

In order to achieve higher prediction accuracy, utility of both most used binary Probit and Logistic regression have been explored. Binary Probit and Logistic regression models provide approximately similar results. However, Logistic regression model is marginally better in depicting the pedestrian road crossing behavior. Therefore, the detailed analysis of the data has been done with Logistic regression model. Pedestrians cross the road unsafely with the gaps available in the traffic. Therefore, gap size parameter is found highly significant variable to determine the pedestrian road crossing behavior.

The adequacy of the fitted models has been checked by analyzing the residuals and influential observations. No significant inadequacy has been found in the models. For the models evaluation of diagnostic statistics and their graphical display detected some cases as outliers. But, it is observed that they did not contribute significantly in parameter estimation and summary measures of model fits.

At the end, we have done the performance analysis i.e. validation of the developed Logistic regression models. Apparent validation has been used to measure how effectively a model

describes the outcome variable in the sample data set. Furthermore, internal validation techniques have been used to measure the performance of the model in the population from which the sample has been taken and these techniques have been taken as an approximation to external validation.

The results of the study are the basic inputs to understand the road crossing behavior of pedestrian and their associated risk needed to design well structured transport system.

Contents

List of Figures

List of Tables